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Cyclical Fluctuation, Growth, and Stabilization: An Empirical Investigation of Dual Policy Objectives in Bangladesh

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Abstract
In conventional economics, two types of macroeconomic policy i.e. fiscal policy and monetary policy are used to streamline the business cycle. This paper has examined the cyclical behavior of these variables over the business cycle of Bangladesh. The objective of this examination is to show whether policies (fiscal policy and monetary policy) in Bangladesh are taken with a motive to stabilize the economy or only to promote economic growth. In other words, it has examined whether the policies in Bangladesh are procyclical or countercyclical or acyclical. Hodrick Prescott (HP) filter has been used to separate the cyclical component of considered variables. Both correlation and regression-based analysis have provided that in Bangladesh government expenditure and interest rates behave procyclically, but money supply behaves acyclically over the business cycle. Besides, this paper has tried to identify the long-term as well as the short-term relationship between real GDP and the macroeconomic policy variables with the help of the Johansen cointegration test, vector error correction model (VECM), and block exogeneity Wald test. Through these analyses, this study has found that fiscal policy has a significant impact on GDP growth both in the short-run and long-run. In the case of monetary policy, although the interest rate has an impact on real output both in the short-run and long-run, the money supply has neither a short-run nor long-run effect on output growth.

Keywords: Cyclical Behavior, Fiscal Policy, Monetary Policy, Macroeconomics, Business Cycle, Cointegration, VECM, Granger Causality, Block Exogeneity

1. Introduction and Background

In capitalist economies, macroeconomic variables experience frequent fluctuation on their long term growth paths. Before the great depression, one of the main objectives of economic research was to examine this cyclical behavior. After the introduction of Keynesian economics, the key focused shifted to the determination of output in the short-run (Hodrick & Prescott, 1996). Notwithstanding, the stagflation in the 1970s has inspired economists to focus again on the study of economic fluctuation. As a result, the study of the business cycle has taken an important place in macroeconomic research.

The business cycle is usually measured by the real GDP. In conventional economics, two types of macroeconomic policy such as fiscal policy and monetary policy are used to streamline the business cycle. The fiscal policy instruments i.e. government expenditure and taxes play an important role to reduce the uneven economic development across countries. In this consideration, John Maynard Keynes suggested taking contractionary fiscal policy during the boom period, and expansionary fiscal policy during the recession (Klein, 1950). This provided that, Keynes focusses on the countercyclical behavior of the fiscal policy instrument. Moreover, the monetary policy instruments i.e. money supply and interest rate also have a momentous impact on the business cycle. Since expansionary monetary policy- increasing the money supply or lowering the interest rate, is expected to boost real output and vice versa, a countercyclical monetary policy is expected to be expansionary during the recession and contractionary during the boom.

The policies taken by the fiscal and monetary authorities have a direct impact on the growth of an economy. The relative effectiveness of fiscal and monetary policy is a debatable issue. While the monetarist believes that the central bank must raise the supply of real money balances to stimulate growth, the Keynesians put more emphasis on fiscal policy as a stabilization tool.

In Bangladesh, the monetary policy decisions are taken by Bangladesh Bank (the central bank of the country). But, in many cases, the bank is directly controlled by the government. The main objectives of the monetary policies taken in Bangladesh are to keep the price level and exchange rate stable and ensure the growth of the economy. The fiscal policies are usually taken by the ministry of finance and the executive branch of the government. Over the past few years, the government has adopted expansionary fiscal policy while the budget deficit has been kept stagnant at 5 percent of GDP (Ministry of finance, 2020).

The economy of Bangladesh is Booming in recent years. The GDP growth rate is consistently rising over the last few years. The average growth rate of real GDP was about 7.4 percent over the last 5 years. While the economy of Bangladesh has been experienced a consistent rise in the growth rate of GDP, there have been found significant ups and downs in the growth rate of policy variables. For an instant, in the last 4 years, the growth rate of government expenditure was 8.37, 7.76, 15.41, and 9.01 respectively, and the growth rate of the money supply was 14.89, 16.69, 13.75, and 11 respectively (The world Bank 2020). This fluctuating behavior of the policy variables raises the scope of investigating the cyclical behavior of the policy variables over the business cycle, and the study has taken the scope. Moreover, in the case of the relative effectiveness of the fiscal and monetary policy, the existing studies provide ambiguous directions. Some studies have mentioned fiscal policy is relatively more effective, some have mentioned the monetary policy to be more effective (Rahman, 2005). Besides, some studies have mentioned while the fiscal policy is effective, monetary policy is completely ineffective (Chowdhury, 1996). This study will try to address this debate empirically.

In this regard, the study has set its **objectives** to-

(i) examine the cyclical behavior of different macroeconomic policy variables of Bangladesh over the business cycle to show whether policies in Bangladesh are taken with the motive to stabilize the economy or only to promote economic growth, and

(ii) identify the long-run as well as the short-run relationship between real output and macroeconomic policy variables to measure the effectiveness of the policies.

2. Data and Methodology

2.1. Data

This study has used the time series data of five macroeconomic variables from 1980 to 2018. The considered variables are real GDP, real government expenditure, real money supply (M2), interest rate, and consumer price index. The data of all the variables are collected from the database of the world development indicators of the World Bank (The world Bank 2020).

2.2. Methodology

To decompose the trend and cycle component of each series, this study has used the Hodrick Prescott (HP) filter. After the decomposition, the study has used both a correlation approach as well as a regression-based approach to examine the cyclical behavior of different policy variables over the business cycle. Besides, to analyze the long-run as well as the short-run relationship between real GDP and macroeconomic policy variables it has performed the Unit root test, Johansen cointegration test, vector error correction model (VECM), and block exogeneity Wald test.

3. Cyclical Behaviour of Macroeconomic Policy Variables over the Business Cycle

Macroeconomics variables such as real GDP, real money supply, and government spending usually exhibit upward trends and therefore are nonstationary. Thus, to identify the cyclical behavior of these variables, it is essential to detrend each series. The detrending technique like the HP filter usually estimates the trend component of a series to make it possible to derive the cyclical component of a series (Ahumada & Garegnani, 1999). The cyclical component obtained from the detrending technique is usually stationary. The statistical properties of the co-movement of the cyclical component of real GDP with the policy variables are directed to the cyclical behavior of the policy variables (Lucas Jr, 1997; Sayan, 2006). The co-movement can be examined based on the correlation approach as well as the regression-based approach.

3.1. Types of Cyclical Behaviour

A policy variable can be Procyclical or Countercyclical or Acyclical.

3.1.1. Procyclical policy

A procyclical policy usually puts an expansionary effect on the business cycle during the boom and a contractionary effect during the recession (Khan, 2011). The procyclical behavior of different policy variables can be defined as:

- Procyclical government expenditure: The positive and significant correlation between the cyclical component of real GDP and the cyclical component of government spending implies government spending as an instrument of fiscal policy is procyclical over the business cycle.
- Procyclical money supply: Money supply as an instrument of monetary policy is procyclical if the correlation between the cyclical component of real GDP and the cyclical component of the money supply is positive and statistically significant.
- Procyclical interest rate: Interest rate as an instrument of monetary policy behaves procyclically over the business cycle if the correlation between the cyclical component of real GDP and the cyclical component of interest rate is found to be negative and statistically significant.

3.1.2. Countercyclical Policy

A countercyclical policy usually puts contractionary pressure on the business cycle during the boom and expansionary pressure during the recession to dampen the business cycle (Khan, 2011). The countercyclical behavior of different policy variables over the business cycle can be defined as:

- Countercyclical government expenditure: The negative and significant correlation between the cyclical component of real GDP and the cyclical component of government spending implies government spending as an instrument of fiscal policy is countercyclical over the business cycle.
- Countercyclical money supply: Money supply as an instrument of monetary policy is countercyclical if the correlation between the cyclical component of real GDP and the cyclical component of the money supply is negative and statistically significant.
- Countercyclical interest rate: Interest rate as an instrument of monetary policy behaves counter-cyclically over the business cycle if the correlation between the cyclical component of real GDP and the cyclical component of interest rate is positive and statistically significant.

3.1.3. Acyclical Policy

An acyclical policy variable does not vary significantly with the nature of the business cycle. Therefore the correlation of the cyclical component of different policy variables with that of real GDP will be insignificant or zero.

3.2. Decomposition of Series by Hodrick Prescott (HP) Filter

A given time series is the sum of growth and cyclical component under the assumption that the data is adjusted for the seasonal component. That is-

$$Y_t = g_t + c_t; \qquad \text{Where, t = 1,.....,T}$$

The Hodrick Prescott (HP) filter tries to estimate a smooth time trend of a time series variables that fits the data very well (Razzak, 1997). After finding the trend component, g_t, the cyclical component, c_t, which is assumed to be stationary, can be obtained as the difference between the actual series and the trend component. The objective function of estimating the time trend is as follows.

$$\text{Min} \sum_{1}^{T} (y_t - g_t)^2 + \lambda \sum_{1}^{T} [(g_{t+1} - g_t) - (g_t - g_{t-1})]^2$$

The first term of the objective function is the sum of the square of the cyclical component, the second term is the variability in growth component, and λ is the smoothing parameter which penalizes the variability in growth component (Hodrick & Prescott, 1996; Adefeso & Mobolaji, 2010). The larger the value of λ the smoother the g_t series. For annual data, the rule of thumb for the value of λ is 100. Since this study has used annual data, the HP filter has been applied with the value of λ is equal to 100 to decompose the trend and cycle component for all the series.

3.3. Correlation Approach to Identify the Cyclical Behaviour

As discussed in section 3.1., the direction and significance of the correlation between the cyclical component of policy variables and the cyclical component of real GDP measure the cyclical behavior of policy variables. In this consideration, Table 1 presents the correlation of the cyclical component of policy variables with the cyclical component of real GDP. Besides, Table 1 also presents the standard deviation of each variable to measure the variability of each variable individually.

Table 1: Policy Instruments' Standard Deviation and Correlation with Real GDP

	Standard deviation	Correlation with Cyclical Component of real GDP	Nature of cyclical behavior
Cyclical Component of Real GDP	7.60	-	-
Cyclical Component of Government spending	1.01	0.747***	Procyclical
Cyclical Component of the Money supply	6.78	0.242	Acyclical
Cyclical Component of Interest rate	0.81	-0.285**	Procyclical

Note:*,**, and *** denote the level of significance at 10%, 5%, and 1% respectively.

Table 1 shows that the cyclical component of real GDP varies most among all the four variables. However, the variability of the cyclical component of money supply significantly high compared to other policy variables i.e. government expenditure and interest rate.

The correlation between the cyclical component of government spending and the cyclical component of real GDP is 0.75 and statistically significant at 1% level. This implies a high positive and significant correlation exists between the variables. This suggests that government expenditure is a procyclical policy instrument in Bangladesh, which implies that, when the economy is doing well, the government expenditure is higher.

On the other hand, the correlation between the cyclical component of the money supply and the cyclical component of real GDP is 0.24, but this is not statistically significant. This implies a low positive but insignificant correlation exists between the variables. Therefore it can be concluded that money supply as an instrument of monetary policy behaves acyclically over the business cycle in Bangladesh.

Finally, the correlation between the cyclical component of interest rate and the cyclical component of real GDP is -0.28 and statistically significant at 5% level. This implies low negative and significant correlation exists between the variables. It indicates that during the boom, the interest rate has an expansionary effect and vice versa. Therefore, we can conclude that although money supply as an instrument of monetary policy behaves acyclically over the business cycle, the interest rate behaves procyclically.

3.4. Regression Approach to Identify the Cyclical Behaviour

The correlation approach did not provide any information to comment on the causal relationship between the cyclical component of real GDP and policy variables. Thus, this study has also applied the regression-based approach to determine the significance of the causal relationship between the cyclical component of different policy variables and the cyclical component of the business cycle. As the business cycle is measured by the real GDP, this study regresses the cyclical component of different policy variables on the cyclical component of real output. For each policy variable, the regression model takes the following form.

$$C_{it} = \propto + \beta_{\mathrm{i}} CGDP_t + \varepsilon t$$

Where C_i is the cyclical component of each of the policy variables, and CGDP is the cyclical component of real GDP. The regressions models are estimated with the Ordinary Least Square (OLS) methods. In this case, OLS provide genuine results since the models use the cyclical component of different variables and there is no chance of spurious result due to the presence of trend in the data. The estimated values of β for each policy variable provide the nature of cyclical behavior and their associate t values provide the significance of the relationship. Table 2 presents the estimated values of βs and their significance level.

Table 2 Estimated Regression Results

	Dependent Variables					
	Cyclical component of Government Expenditure		Cyclical component of Money Supply		Cyclical component of Interest Rate	
	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic
Cyclical Component of Real GDP	0.101***	7.08	0.216	1.52	-3.07*	-1.88
Constant	0.002	1.37	-0.018	-1.60	-2.51	-1.95

Note:*,**, and *** denote the level of significance at 10%, 5%, and 1% respectively.

The result obtains here are matched with the result of the correlation approach. The coefficient of the cyclical component of real GDP is positive when regressed with the cyclical component of government expenditure and money supply, and is negative when regressed with the cyclical component of the interest rate. Here, it should be noted that the coefficient of the cyclical component of real GDP is significant at 1 percent level when regressed with the cyclical component of government spending and at 10 percent level when regressed with the cyclical component of the interest rate. However, the coefficient is insignificant when regressed with the cyclical component of the money supply. This provided that, the government expenditure and interest rate are procyclical, but the money supply is acyclical. This provides that, the shock in the money supply does not have any significant impact on the business cycle. Therefore, we can conclude that, in Bangladesh, the cyclical fluctuation of the money supply does not vary significantly with the cyclical fluctuation of real GDP. A detailed diagnosis of this behavior of money supply has been presented in section 5.

4. Long-Term & Short-Term Relationship of the Policy Variables with Real GDP

4.1. Model Specification

The growth path of an economy is mostly determined by the fiscal policy and monetary policy. So, fiscal policy and monetary policy instruments are considered explanatory variables of the model where real GDP is the dependent variable. Besides the policy instruments, this model includes the Consumer Price Index (CPI), since the price level has a significant impact on GDP. Due to the unavailability of time series data of tax rates, this model cannot include this important fiscal policy instrument into the model. Since the consequences of decreasing tax rate and increasing government expenditure on overall output are similar, it will not be a problem to comment on overall fiscal policy considering only government spending.

So, the theoretical basis of the empirical model can be written as –

$$\mathrm{LnGDP_t} = \beta_0 + \beta_1 \mathrm{LnGE_t} + \beta_2\ \mathrm{LnMS_t} + \beta_3\ \mathrm{INT_t} + \beta_4\ \mathrm{LnCPI_t} + \varepsilon_t$$

Where, LnGDP = Log of real GDP, LnGE=log of real government expenditure, LnMS= log of real money supply, INT= interest rate, LnCPI= log of the consumer price index, and ε= error term.

The expected sign for β_1, β_2 and β_4 is positive, and β_3 is negative.

4.2. Stationarity Test

Non-stationarity of macroeconomic variables is a common problem in time series analysis (Maysami, R. C., & Koh, T. S., 2000). As per rule, non-stationary data are unpredictable and cannot be modeled, since the results obtained by using non-stationary time series may be spurious (Naser, 2015). So, it is always suggested to carry out a stationarity test before working with time-series data. For this purpose, this study has employed the Augmented Dickey-Fuller (ADF) test and the Phillips Perron (PP) test to check the unit root (non-stationarity) for all the variables at the log level. Table 3 reports the result of the tests.

Table 3: Unit Root Test

Variables	ADF		PP		Comments
	With intercept	With trend and intercept	With intercept	With trend and intercept	
GDP	6.184	1.071	6.184	1.212	
ΔGDP	-1.418	-4.489***	-3.524***	-9.504***	I(1)
MS	-0.236	-2.606	-0.225	-2.315	
ΔMS	-5.077***	-5.002***	-4.992***	-4.906***	I(1)
GS	2.081	-1.072	2.037	-0.228	
ΔGS	-4.399***	-3.448*	-4.538***	-5.859***	I(1)
IR	-0.922	-2.399	-1.409	-1.178	
ΔIR	-4.084***	-4.197***	-4.051***	-4.081***	I(1)
CPI	0.913	0.667	0.913	0.472	
Δ CPI	0.002	0.001***	0.002	0.001***	I(1)
Note:*,**, and *** denote rejection of the null hypothesis that the series has a unit root at 10%, 5%, and 1% level of significance respectively					

According to ADF test results, where the null hypothesis is variable has a unit root, all variables are non-stationary at the level in both intercept, and trend and intercept specification. But, in the case of the first difference, the hypothesis of non-stationary or presence of unit root is rejected at 99% level of confidence for all the variables except real GDP which is found insignificant in the case of intercept specification but significant in the case of trend and intercept specification.

Besides, like ADF test results, according to the PP test results, all variables are non-stationary at the level in both intercept, and trend and intercept specification. But, in the case of the first difference, the hypothesis of non-stationary or presence of unit root is rejected at 99% level of confidence for all the variables for both types of specifications.

So, it can be concluded that all the variables are integrated in order one, I(1), and the variables are ready for the co-integration test

4.3. Lag Selection Criterion

Before going for the Johansen co-integration test, the optimal lag length for Johansen procedures has to determine. For this purpose, this study has identified the VAR lag order selection criterion. Table 4 presents the result of the VAR lag order selection criterion. Based on the Schwarz Bayes criterion (SC), one lag is selected for all variables as the optimal lag length.

Table 4: VAR Lag Length Criterion

Lag	Log L	LR	AIC	SC	HQ
0	85.06358	N/A	-4.70962	-4.48516	-4.63307
1	317.9567	383.5887*	-16.9386	15.59184*	-16.4793
2	337.9553	27.0569	-16.6444	-14.1753	15.8024
3	366.8686	30.61409	-16.8746	-13.2832	-15.6498
4	392.6563	19.72004	-16.921	12.2072	-15.3134
5	464.0424	33.59345	-13.8135	-13.8135	-17.65928*

4.4. Johansen Cointegration Test: The Long-Run Relationship

To find the long-term relationship between the policy variables and real output the Johansen multivariate approach of cointegration test has been used. By examining the number of independent linear combination for a set of time series variables that yields a stationary process, Johansen approaches to identify the cointegrating relationship among the variables (Stern, 2000). To identify the presence of a cointegrating equation, considering optimal lag length equals 1 and no trend in VAR, Trace statistics and Maximum Eigen Value statistics have been calculated. Table 5 presents the results of the Johansen cointegration test. Here, the null hypothesis of no cointegrating equation is rejected in both trace and maximum eigenvalue statistics at 5% significance level. Further, the trace statistics also reject the null hypothesis of at most 1 cointegrating equation at 5% significance level. Thus, the Trace test indicates there exist at least 2 cointegrating equations while the maximum eigenvalue test indicates at least 1 cointegrating equation at 5 percent level of significance.

Table 5: Co-integration Rank Test for the Real Output Equation

	Trace Test			Maximum Eigen Value Test		
Hypothesized no of CE(s)	Trace statistics	5% critical value	Probability **	Max Eigen statistics	5% critical value	Probability **
None*	114.4160	69.81	0.0000*	60.93	33.87	0.0000*
At most 1	53.48485	47.85	0.0135*	23.86	27.58	0.1395
At most 2	29.61897	29.79	0.0524	16.15	21.13	0.2160
At most 3	13.46505	15.49	0.0988	10.05	14.26	0.2083

The existence of a cointegrating equation among the variables implies that there exists a long-term relationship among GDP, government expenditure, money supply, interest rate, and CPI. The estimated long-run regression results are presented in Table 6.

Table 6: Long Run Cointegrating Equation

	Dependent Variable: LnGDP		
	Coefficient	Standard Error	t-statistics
LnGE	0.182	0.04313	4.224
LnMS	0.003	0.01971	0.019
INT	- 0.013	0.00163	-7.747
LnCPI	0.705	0.03707	19.037
Constant	21.44	-	-

The cointegrating equation fulfills all the expected signs that are mentioned in section 4.1. The cointegrating equation shows that government spending as a fiscal policy instrument has a significant long-run impact on real output growth. The estimated coefficient of 0.18 implies that a 1 percent increase in government spending is associated with about 0.18 percent increase in real GDP. Result also shows that interest rate has a significant negative impact on GDP growth and CPI has a significant positive impact on GDP growth. But the impact of Money supply on GDP growth is found insignificant, which implies that, in the case of Bangladesh, the money supply is an ineffective monetary instrument. Why the money supply is ineffective and what is the main objective of the monetary policy of Bangladesh are explained in section 5.

4.5. Vector Error Correction Model (VECM)

Vector Error Correction Model captures the short-run adjustment dynamics of the independent variables to converge to their long-run cointegration relationship (Brüggemann, 2006). The VECM representation of the model could have the following form.

$$\Delta \mathrm{LnGDP}_t = C_0 + C_1 \mathrm{EC}_{t-1} + C_2\, \Delta \mathrm{LnGDP}_{t-1} + C_3 \Delta \mathrm{LnGE}_{t-1} + C_4 \Delta \mathrm{LnMS}_{t-1} + C_5 \Delta \mathrm{INT}_{t-1} + C_6 \mathrm{CPI}_{t-1}$$

Here, C_1 is the coefficient of error correction term which measures the speed of adjustment towards long term equilibrium. Table 7 shows the value of the coefficient, Standard deviation, and t-statistics of the error correction term.

Table 7: Details of Error Correction Term

	Coefficient	Standard Error	t-statistics
Error Correction Term	-0.4188***	0.055	-7.526

Here, the error correction term is negative and statistically significant at 1% level, which indicates that there is long term adjustment from any deviation in the short run. The coefficient value implies that the speed of adjustments is 41.88 percent per year, which means approximately 2.5 years is required to adjust with any short-run shock.

4.6. VEC Granger Causality/Block Exogeneity Wald Test: The Short Run Relationship

The vector error correction Granger Causality/ Block Exogeneity Wald test has been used to see the short-run causal relationship between real GDP and policy variables. Table 8 provides the result of the test. According to the result, all the variables jointly granger cause real output. The probability value of chi sq. test statistics also shows that real government spending, interest rate, and CPI individually granger cause real output in the short run. However, the real money supply does not directly granger cause real output in the short run. So we can conclude there is a short-run causality running from government spending, interest rate, and CPI to real output but no short-run causality running from real money supply to real output.

Table 8:VEC Granger Causality Test / Block Exogeneity Wald Test

Dependent variable D(GDP)			
Excluded	Df	Chi sq.	Prob.
D (RGS)	1	3.0652	0.0800*
D (MS)	1	0.2658	0.6061
D (IR)	1	3.0181	0.0823*
D (CPI)	1	6.0716	0.0137**
ALL	4	9.5418	0.0489**

4.7. Diagnostics Test

In order to check the acceptability of the model, this study has carried out various diagnostic tests namely the autocorrelation LM test, and heteroskedasticity test, and stability test.

4.7.1. Autocorrelation LM Test

The Serial Correlation LM test confirms that there is no serial correlation in the residuals of the ECM regression up to four lags as LM statistics and their associated P-value implies not to reject the Null hypothesis of no serial correlation.

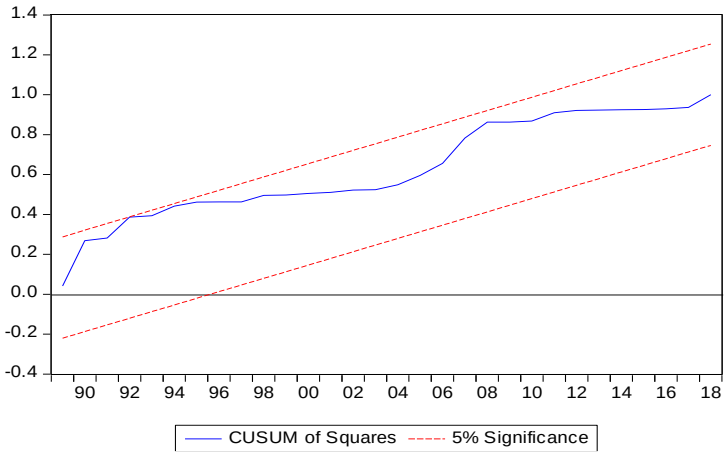
4.7.2. Heteroskedasticity Tests

The heteroskedasticity test result shows that the test cannot reject the null hypothesis of no heteroskedasticity in the case of both joint and individual tests.

4.7.3. Stability Test

The CUSUM of Squares test has been used for checking the structure stability and the constancy of the coefficients in the model. Figure 1 presents the result of the test. From figure 1 it is clear that the model is stable at a 5% level of significance.

Figure 1: CUSUM of Square test



5. Diagnosis of Monetary Policy

The study has not found any significant relationship between the cyclical component of money supply and real output (section 3.3). Besides, the result of the cointegrating equation has shown that real money balance does not have any significant impact on the real output growth in the long run (section 4.4). Finally, from the block exogeneity Wald test we have found that there is no short-run causality running from real money balances to real GDP (section 4.6). All these findings imply that money supply as an instrument of monetary policy is mostly ineffective in stimulating growth.

It is needed to diagnose the monetary policy ineffectiveness in Bangladesh. Let's determine the overall behavior of the money supply and inflation rate over the past few decades with the help of the quantity theory of money (Friedman, 1989).

We know from the quantity theory of money that-

$$MV=PY$$

Where M is the number of money balances proxied by broad money, V is the velocity of money, P is the price level proxied by the consumer price index and Y is the real output or real GDP.

This equation shows that the price level will be stable if the growth rate in money balances and the growth in the velocity of money is exactly equal to the growth rate in real output.

$$P = V\frac{M}{Y}$$

The log transformation of the equation provides,

$$Ln\ P = lnM + lnV - lnY$$
$$LnM = lnP + \ln Y - lnV$$

Thus, the growth of money supply equals the growth of price plus growth of output minus growth of velocity of money.

For Bangladesh, the average growth rate of real money balances is about 15 percent, real GDP is 5 percent, and the average inflation rate is 6 percent over the period from 1980 to 2018. Putting these estimated average growth rate into equation 2 provides that the average growth of the velocity of money is 2 percent over the period from 1980 to 2018. The increase in the money supply has an impact on the price level and the monetary authority tends to stimulate growth by increasing the money supply as the growth in the money supply exceeds the growth in the price level. But the objective of the monetary authority does not seem to be satisfied with the findings of this study. Since Bangladesh has adopted the structural adjustment policy, monetary policy has been taken very cautiously. The reason is that inflation has always been an important issue for the political government of Bangladesh. So the main objective of monetary policy in Bangladesh is to keep the price level stable. In this case, considering the growth rate of output and velocity, the monetary authority takes monetary policy to obtain the desired level of the price level. This implies that there is strong cooperation between the authority of monetary policy and the authority of fiscal policy, where fiscal policymaker focuses on economic growth and monetary policymakers focus on controlling the inflation rate. This provided that, the Bangladesh Bank (the central bank of the country) does not still have that independence to get the monetary policy instruments determined through the market mechanism. Since monetary policy instruments in Bangladesh are not market-driven rather controlled, money supply as an instrument of monetary policy is mostly ineffective in stimulating growth. Moreover, the poor monetary infrastructure and the lack of proper management also contributes to the ineffectiveness of the monetary policy. The interest rate is not being allowed to be determined by the market through the monetary mechanism and therefore the money supply has no scope for stimulating investment. Moreover, the other instruments of monetary policy such as bank rate and reserve required ratio have hardly changed in Bangladesh in recent times.

6. Conclusion

To understand the growth phenomenal of Bangladesh, the study has examined the cyclical behavior of the macroeconomic policy variables over the business cycle and empirically investigated their relative effectiveness in stimulating economic growth. From the empirical analysis, this study has shown that real output varies significantly with the cyclical fluctuation in government spending. Thus, the procyclical behavior of the fiscal policy instruments in Bangladesh implies that the most important motives behind the fiscal policy formulations are to stimulate growth. More spending on development projects has added spirit to the growth path. On the one side, Bangladesh makes huge government expenditure, but on the other side, the tax-GDP ratio of Bangladesh is very low. This implies that a large fraction of the spending comes from borrowing. But, to ensure the wellbeing of the economy and to maintain the sustainable growth of the development projects, expenditure should be financed with the revenue earned through tax instead of borrowing. Besides, the poor quality of government spending and the rising government debt may lead the country to a possible risk of recession. For this, the capability of the economy to raise the tax GDP ratio and the quality of government spending should be increased. To improve the quality of government spending Public-Private Partnership (PPP) could be a good policy instrument. However, to ensure the effectiveness of PPP good governance must be ensured.

In case of monetary policy, this study has found that although money supply as an instrument of monetary policy behaves acyclically over the business cycle, interest rate behaves procyclically. Moreover, we have found that money supply has a neither short-run nor long-run impact on GDP growth since the main objective of monetary policy is to keep the price level stable and to keep the interest rate a desirable level. However, the interest rate as an instrument of monetary policy has some impact in stimulating output growth. This implies that there is strong cooperation between the authority of monetary policy and the authority of fiscal policy, where fiscal policymaker focuses on economic growth and monetary policymakers focus on controlling the inflation rate. Thus, it seems that, by the cooperation between monetary authority and fiscal policy authority, together they successfully able to stimulate economic growth in Bangladesh. But, it should be kept in mind that this is obtained by the sacrifice of the independence of monetary authority.

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